

## **SECTION 01150**

### **MEASUREMENT AND PAYMENT**

#### **1.1 DESCRIPTION OF WORK**

- A. Work Included: This Section specifies the general requirements for Measurement and Payment.
- B. Provisions of this Section are augmented by the measurement and payment provisions for specific classifications of construction, materials, and services as specified in the applicable sections of these Standard Specifications, the Contract Specifications, the MBTA Contractor's Change Order Manual and as listed in the Bid Form for a specific contract.

#### **1.2 MEASUREMENT OF QUANTITIES**

- A. Quantities of various items of work provided shall be determined, for purposes of payment, by the Owner and by the Contractor for purposes of the certification(s) of work provided that are required by the provisions of Article 1.06.
- B. Upon the completion of Work and before final payment is made the Owner will make final measurement to determine quantities of various items of work performed, as the basis for final settlement. Measurements will be made according to United State standard units of measurement.
- C. Method of measurement and computations to be used in determination of quantities of material furnished and of work provided under the Contract will be those methods generally recognized as conforming to good engineering practice.
- D. Unless otherwise specified, the following shall apply:
  - 1. Longitudinal measurements for area computations will be made horizontally and transverse measurements will be the neat dimensions shown on the Drawings or ordered in writing by the Owner. Deductions will not be made for individual fixtures having an area of 9 square feet or less.
  - 2. Structures will be measured according to neat lines indicated or as ordered in writing, unless otherwise specified. Concrete and masonry will be measured and accurately computed by dividing the work into simple geometrical figures and adding their volumes.
  - 3. Items which are measured by the linear foot, such as guardrail, underdrains, and the like, will be measured parallel to the base or foundation upon which such structures are placed, unless otherwise indicated or specified.

4. In computing volumes of excavation, embankment or borrow, methods utilizing electronic computation, planimeters or other accepted engineering procedures having general acceptance in the engineering profession will be used. When measurement is based on cross sectional area, average end area method will be used.
5. Allowance will not be made for surfaces laid over a greater area than those indicated, or for any material moved from outside the area of cross section and lines shown on the Drawings except when specifically authorized by the Owner.
6. The term "gauge" when used in connection with the measurement of plates, will mean the U.S. Standard Gauge, except that when reference is made to the measurements of galvanized or aluminum sheets used in the manufacture of corrugated metal pipe, metal place culverts and arches, metal cribbing and corrugated aluminum pipe, the term "gauge" will mean that specified in AASHTO Designations M36, M167, M196 or M197.
7. When the term "gauge" refers to the measurement of wire, it will mean the wire gauge specified in AASHTO Designation M32.
8. The term "pound" when used in the measurement or payment of any material or work, will mean 16 ounces avoirdupois, based on computed or scale weight.
9. The term "ton" when used in the measurement or payment of any material or work, will mean the short tone consisting of 2,000 pounds avoirdupois. When applicable, materials measured in pounds will be converted to tons.
10. Materials which are specified for measurement by weight shall be weighed on standard scales furnished by and at the expense of the Contractor. Such scales shall be sealed at the expense of the Contractor as often as is necessary to insure their accuracy. A sworn weigher to be compensated by the Contractor shall weigh materials required to be weighed as above provided. Weighing of such materials may be witnessed by the Owner. If materials are shipped by rail or trucks, the car weights or quarry weights may be accepted but scales shall be used as above, if so directed. Weight slips shall be provided for each shipment of material weighed. Each weight slip shall be signed by the sworn weigher. Weight slips will be countersigned on delivery by the Owner and no weight slip not so countersigned will be included for payment under the Contract.
11. When requested by the Contractor and approved by the Engineer in writing, material specified to be measured by the cubic yard may be weighed and such weights will be converted to cubic yards for payment purposes. Factors for conversion from weight measurement to volume measurement will be determined by the Engineer and shall

be agreed to by the Contractor before such method of measurement to pay quantity is used.

12. Bituminous materials, where specified to be paid for separately, will be measured for payment by the gallon, or by the ton and converted to gallons.
13. Bitumen delivered in tank trucks or tank feeders shall be weighed on scales and the volume computed on the basis of a current tabulation of "Weights per Gallon of Bituminous Materials," as approved by the Authority.
  - a. Provisions for weighing bitumen shall conform to the requirements of Article 1.2 D.10 above.
  - b. Bitumen delivered in tank cars, when not actually weighed, shall be measured by volume at loading temperature, and this quantity converted to the volume at the applying temperature. Coefficient of expansion or contraction per degree F shall be .00035 for asphalt, .00025 for asphaltic emulsions, .0004 for cutback asphalt and .0003 for tar.
  - c. In no case shall the total number of gallons of bituminous material for any car be in excess of the United States Interstate Commerce Commission's rating for the car, plus the expansion based on the volumetric change between the loading and the specific application temperature.
  - d. Only the quantity of bituminous material actually placed in the Work and accepted will be considered in determining the amount due the Contractor.
14. Where specified to be paid for separately, Portland cement will be measured by the bag or barrel as indicated. A bag of cement shall contain 94 pounds net and shall be considered equal to 1 cub foot. A barrel of cement shall weigh 376 pounds net.
15. Timber will be measured by the 1,000 feet board measure (M.F.B.M.) actually incorporated in the structure. Measurement will be based on nominal widths and thicknesses and the extreme length of each piece.
16. The term "each," when used as an item of payment, such as project markers, right-of-way monuments, and the like, will mean complete payment for the work prescribed for that item.
17. The term "lump sum," when used as an item of payment, will mean complete payment for the work prescribed for that portion of the Contract work under the item, or all work prescribed in the Contract, as the case may be.

18. When a complete structure or structural unit (in effect, "lump sum" work) is specified as the unit of measurement, the unit will be construed to include all necessary fittings and accessories.
19. The Quantities may be shown on the Contract Drawings for items for which lump sum is the method of measurement. If shown, the quantities are approximate and are shown for estimating purposes only. The Contractor shall ensure that the lump sum price, whether the base bid or lump sum breakdown per Activity (see Construction Schedule specifications), includes all labor, equipment and material to provide the Work complete in place.
20. The term "complete in place," when used in the measurement and payment provisions, means the completion of the contract item, including the furnishing of all materials, equipment, tools, labor and work incidental thereto, unless otherwise specified.
21. Rental of equipment will be measured by hours of actual working time and necessary traveling time of the equipment within limits of the Contract or between the source of supply and contract site (but not exceeding 100 miles) except when special conditions or other agreements make some other method of measurement desirable and is specified. (Also see Article 1.4B of this Section 01150)
22. When standard manufactured items are specified such as fence, wire, plates, rolled shapes, culvert pipe, and the like, and these items are identified by gauge, unit weight, section dimensions, or other measurements, such identification will be considered to be nominal weights or dimensions. Unless more stringently controlled by tolerances in cited specifications, manufacturing tolerances established by the industries involved will be accepted.

### **1.3 SCOPE OF PAYMENTS**

- A. The Authority will pay and the Contractor shall receive and accept the compensation as provided in the Schedule of Prices, in full payment for furnishing all materials, labor, tools and equipment and for performing all work contemplated and embraced under the Contract; also for all loss or damage arising out of the nature of the Work, or from the action of the elements (except as specified in General Conditions), or from any unforeseen difficulties or obstructions which may arise or be encountered during the prosecution of the Work (except as set forth in General Conditions) until its final approval by the Authority, and for all risks of every description connected with the prosecution of the Work; also for all expenses incurred by or in consequence of the suspension or discontinuance of the said prosecution of the Work (except as provided in General Conditions), and for any infringement of patent, trademark or copyright, and for completing the Work in an acceptable manner according to the Contract Documents.
- B. Payment of any current estimate, or any retained percentage shall in no way constitute an acknowledgment of the acceptance of the Work or in no way or degree prejudice or affect the obligation of the Contractor, at his own cost

and expense, to repair, correct, renew or replace any defects and imperfections in the construction of, or in the strength of, or quality of materials used in or about the construction of the Work under Contract and its appurtenances, as well as damages due or attributable to such defects; which defects, imperfections or damages shall have been discovered on or before the expiration of the one year guaranty period specified in General Conditions. The Owner shall be the sole judge of such defects, imperfections, or damages and the Contractor shall be liable to the Authority for failure to correct the same as provided herein. (Also refer to the General Conditions)

- C. If the "measurement and payment" clause in the Construction Specifications relating to any price in the Bid Form requires that said price cover and be considered compensating for certain work or material essential to the item, this same work or material will not also be measured or paid for under any other pay item which may appear elsewhere in the Specifications.
- D. Except as specifically provided otherwise, no separate payment will be made for any work in fulfillment of the requirements of these Division 1, General requirements nor of the respective Specifications relating thereto, and all cost thereof shall be included in the various prices bid or the pay items scheduled in the Bid Form.

#### **1.4 COMPENSATION FOR ALTERED QUANTITIES**

- A. When the accepted quantities of work vary from the estimated quantities set forth in the Contract, and whether or not there have been any changes in plans, the Contractor shall accept as payment in full, so far as contract items are concerned, payment at the original contract prices for the accepted quantities of work done. No allowance or other adjustment except as provided in General Conditions Section 00700 shall be made for any increased expense, loss of expected reimbursement, or loss of anticipated profits suffered or claimed by the Contractor resulting either directly from such alterations or indirectly from unbalanced allocation among the contract items of overhead expense on the part of the Contractor and subsequent loss of expected reimbursements therefore or from any other cause except the said payment for the actual quantity done at the original contract unit price.
- B. When the accepted quantities of work reach 75% of the quantities in the Bid Form and the Contractor anticipates that known work will require a quantity of units in excess of the units in the bid, the Contractor shall notify the Authority that additional quantities of work will be required and submit a proposed cost to complete the work in excess of the bid units. Once agreement is reached for the extra work, a Change Order will be issued in accordance with this Section and the Contractor Change Order Manual.
- C. The Contractor is obligated to bid work in a responsive and responsible manner. Prices proposed for the work must be realistic. During the bid evaluation process, bids that are weighted with unrealistically high values for work at the beginning of the Contract and/or bids that carry

unrealistically high or low unit prices may be considered nonresponsive or non-responsible

## **1.5 PAYMENT FOR EXTRA WORK [SEE the MBTA CONTRACTOR CHANGE ORDER MANUAL]**

## **1.6 OMITTED ITEMS**

- A. Should any item or items of Contract work be determined unnecessary for the proper completion of the Work, the Authority may, upon written notice to the Contractor, eliminate such item or items from the Contract and allowance will not be made for such items so eliminated in making final payment to the Contractor, except for such actual work as shall be done and materials purchased, including the cost of moving in and out the special equipment necessary for work on the eliminated item or items, prior to notification of the elimination of such item or items. The amount of the credit to the Authority shall be determined in a similar manner as described above for payments for extra work, except as provided by the Contractor Change Order Manual. This Article shall also apply to work eliminated from the Contract Documents in the form of a lump sum credit to the Owner.

## **1.7 PROGRESS PAYMENTS**

- A. Monthly, the Owner will make an estimate in writing of the total amount of the work done to the date of such estimate and the value thereof, including advance payments on materials stores or on hand but not yet incorporated in the Work which may be made as provided in Article 1.7 of this Section. The Authority will retain the following from these payments:
  1. Five percent of the approved amount of the payment to secure satisfactory performance of the Contract Work.
  2. An amount sufficient to cover claims it has against the Contractor.
  3. An amount sufficient to cover all demands for direct payment filed by subcontractors under Chapter 30 Section 39F of the General Laws of the Commonwealth.
  4. Five percent of the value of all items to be planted in the ground.

The Owner will pay monthly to the Contractor while carrying on the work the balance not retained as hereinbefore provided. No such estimates or payment shall be required to be made when, in the Owner's judgment, the work is not proceeding in accordance with the provisions of the Contract, or when in his judgment the total value of the work done since the last estimate amounts to less than \$500.00.

- B. The Owner may, at its option, after 50 percent of the Work has been completed and (1) if the work is proceeding in accordance with the approved

CPM Construction Plan submitted under the Construction Schedule specifications and (2) is being performed in accordance with the Specifications and the Contract, not retain the 5 percent to secure satisfactory performance of the Contract Work as provided in of this Section 01150 on any subsequent payments. The contractor must formally request and seek approval from the Owner to stop retaining the 5 percent. The MBTA Project Office must also submit a memorandum to formally request approval from Contract Administration on the releasing of the 5 percent retainage. However, if the Authority does not retain these monies, it will reimpose this 5 percent retainage on all subsequent payments should the Contractor fail to maintain progress in accordance with the Contract and approved schedule or fail to execute the Work as required by the Specifications and Contract. Retainages withheld under A (2) and (3) will remain in effect throughout the Contract Work period as detailed therein. Retainage withheld under A (4) for plantings will be retained until Final Acceptance

- C. Partial payments will be made on lump sum contracts, and on lump sum items of a contract if the Contractor requests partial payment of such an item, in accordance with a schedule of the quantities and unit prices for the major components of a lump sum contract or of the lump sum items of a contract, to be submitted by the Contractor and approved by the Owner prior to making partial payments for such contract or for such items. For lump sum contracts, this schedule of major components shall approximate the activities shown on the CPM Construction Plan required by the Construction Schedule specification. Each component part shall be considered as including all its concomitance so that the total cost listed for the components is the contract cost for the item. Approval of the schedule by the Owner shall not be considered as a guarantee to the Contractor that the quantities shown on the schedule are the approximate quantities actually included in the lump sum items. The schedule is only for the purpose of estimating partial payments, and it shall not affect the contract terms in any way.
- D. The Contractor shall certify in writing on forms approved by the Owner that the work for which payment is included in the estimate in question, has in fact been done.
- E. Whenever the Work is substantially complete, the Owner may, if it considers the amount retained to be in excess of the amount adequate for its protection, at its discretion, release to the Contractor all or a portion of such excess amount and may cause the Contractor to be paid, temporarily or permanently, from time to time, such portion of the reserve as it deems prudent.
- F. When a subcontractor's work is satisfactorily completed as discussed in Appendix 3 of Section 00800, the Contractor may invoice the Owner for the full amount of the subcontractor's retainage with appropriate backup, including, but not limited to, a copy of the retainage provision in the subcontract, and evidence that the subcontractor's work is satisfactorily completed.

- G. When the first partial payment estimate is prepared, the Contractor shall submit to the Owner a cash drawdown forecast indicating the estimated amount of each partial payment by month, projected through completion of the project. The Contractor shall, with each succeeding partial payment estimate, submit updated cash drawdown forecasts to the Owner. The forecast is for the purpose of estimating cash requirements.
- H. Massachusetts Bay Transportation Authority-Statement of Payment to Subcontractors Form is included at the end of this Section 01150. It must be completed and signed by authorized contractor representative and submitted to the Authority with each payment request.
- I. Massachusetts Bay Transportation Authority - Sworn Statement of Account and Partial Release form is included as an appendix to the MBTA Project Controls Manual. The most recent edition of the Project Controls Manual can be found on the owner's web site. A link to the Project Controls Manual can be provided upon request. The Sworn Statement of Account form must be completed and signed by an authorized officer of the contractor and submitted to the Owner with each monthly partial payment request. In the event the contractor does not submit a partial payment request for any month during the contract duration, the contractor is still required to submit the Contractor's Sworn Statement of Account and Partial Release by the 15th of the month for the period ending the last calendar date of the previous month.
- J. With each partial payment estimate, the Contractor shall submit, at a minimum, the following information which is extracted from the As-Planned Schedule:
  - a. Progress Schedule Submittal # that is the basis for the partial payment request
  - b. Activity ID
  - c. Activity Description
  - d. Budgeted cost for each Activity in the Lump Sum contract
  - e. Value completed this period
  - f. Percentage completed this period
  - g. Value completed to date
  - h. Percentage completed to date
  - i. Balance of budgeted cost per activity
  - j. Separate information must be provided per DBE Subcontractor, including:
    - 1. DBE budgeted cost

2. DBE value completed this period
3. DBE percentage completed this period
4. DBE value completed to date
5. DBE percentage completed to date
6. Balance of DBE value

7. Other information required by MBTA Contract Administration

K. Failure to provide this information with each partial payment request will result in non-payment by the Owner.

L. All material incorporated into the Work shall become the sole property of the Owner, but this shall not be construed as relieving the Contractor from the sole responsibility for all material and Work under the Contract or for the restoration of any damaged Work or waiving the right of the Owner to require the fulfillment of all the terms of the Contract. The Owner shall retain all rights under the Contract including without limitation the right to reject material subsequently found unsatisfactory and the right to enforce the provisions of the General Conditions of the Contract.

M. Massachusetts Bay Transportation Authority - Sworn Statement of Account and Partial Release form is included as an appendix to the MBTA Project Controls Manual. The most recent edition of the Project Controls Manual can be found on the owner's web site. A link to the Project Controls Manual can be provided upon request. The Sworn Statement of Account form must be completed and signed by an authorized officer of the contractor and submitted to the Owner with each monthly partial payment request. In the event the contractor does not submit a partial payment request for any month during the contract duration, the contractor is still required to submit the Contractor's Sworn Statement of Account and Partial Release by the 15th of the month for the period ending the last calendar date of the previous month.

## **1.8 PAYMENT FOR MATERIALS STORED OR ON HAND**

A. When requested in writing by the Contractor, allowances may be made on partial payments for certain materials stored or on hand, but not incorporated in the Work, subject to the following terms and conditions.

B. Upon presentation to the Owner by the Contractor of copies of paid invoices, advance payments may be made for acceptable reinforcing steel, structural steel, piles, culvert pipe, guard rail, track rails, precast prestressed concrete members, costly machinery items, and other similar nonperishable materials purchased expressly for the Work and delivered on or in the approved storage places at the site, but which materials are not considered as erected or complete in place under the items of the Contract, and for which partial payment would not otherwise be made until such materials and items were erected or complete in place.

- C. The amount to be included in the estimate will be the value of the materials as shown by the certified copies of paid invoices including transportation and handling costs. However, the Owner reserves the right to limit payment for such materials when such payment is based upon a standard unit of measure. When contract payments are made on the basis of estimated quantities, payment for material stores or on-hand may be limited to an amount not to exceed the value of ninety (90) percent of the estimated contract quantity.
- D. Before any advance on materials is made as hereinbefore provided, the Owner will require, as security for the incorporation of the materials in the Work, documents from the Contractor transferring to the Authority the absolute legal title to such materials.
- E. However, the transfer of title and the partial payment for such materials shall not in itself constitute acceptance of same nor void the right to reject material subsequently found unsatisfactory as provided in General Conditions, nor in any way relieve the Contractor of his responsibility for satisfactorily furnishing and placing the material in the Work in accordance with the terms of the Contract.
- F. In the event any of such material subsequently becomes lost, stolen, impaired, or damaged, the monetary value of the lost, stolen, impaired, or damaged material as may have been paid for in a current estimate will be deducted from the next estimate, and no further payment will be made therefor until such material has been satisfactorily replaced in accordance with Specification requirements.
- G. If it is impossible due to lack of area on the site or other valid reason, the Contractor may request in writing permission from the Owner to store materials off the site and still have the materials paid for as materials on hand and the Owner may approve payment; however, no advance payment for material stores off the site will be made until written approval of the Owner has been given. This request will state the reason for the request, location of proposed storage site, and methods that will be employed to insure that material is properly protected and will be used on the particular Contract. The amount to be included in the estimate for materials stores off the site will be limited to 80 percent of the value of the materials as shown by the certified copies of paid invoices including transportation and handling costs.
- H. In the case of property not owned or controlled by the Authority, the Contractor shall also lease, or procure a lease, free from encumbrances to the Authority, such lease to be in a form approved by the Authority and to contain provisions for the protection and indemnification by the Contractor of the Authority, its employees and agents, against all claims by reason of such lease or by reason of anything done or permitted in or upon the leased sites. The Contractor shall also take such steps as the Authority may require for the purpose of security and assuring to the Authority the control of such materials, particularly the right to enter upon the property, take possession of such materials and use the same.

1. No advance payment for materials stores or on-hand, but not incorporated in the work, will be made in an estimate when the value therefor amounts to less than \$10,000 per contract bid item and represents the value of at least fifty percent of the estimated quantity involved as shown in the contract or as determined by the Owner.
2. Deductions at rates and in amounts which are equal to the advance payments will be made under the appropriate Contract pay items in estimates as the materials are incorporated in the Work.

## **1.9 SEMI-FINAL ESTIMATE**

- A. A semi-final estimate may be made, at the discretion of the Authority, under the following conditions:
  1. If, after final inspection has been made, there are any payments or Extra Work items that are in dispute between the Contractor and the Authority, either as to the quantity or value of work provided thereunder, such items or claims may be excluded from the final estimate, and payment for such disputed items may be deferred until such time as agreement has been reached between the Contractor and the Authority or until such claim has been adjudicated. In such case, a semi-final estimate shall be prepared within a period of 65 days after substantial completion of the Contract Work covering the value of Work provided and retained percentage on items of the Contract that are not in dispute and with disputed items or claims excluded but subject to deduction and retention of a sum sufficient to satisfy any and all outstanding claims or liens that have been duly filed by subcontractors and materialmen against the Contractor, or to cover amount of such claims or liens that may have been paid by the Authority directly to others for the Contractor's account (see General Conditions), and subject to deduction and retention from such payment any other amounts to be deducted and retained in accordance with the terms of the Contract. The existence of a dispute between the Contractor and the Authority as to any payment item or items shall not be considered a valid reason for delaying preparation of a semi-final estimate as provided herein.
  2. In the event the Contract has been substantially completed and the Contract has been opened to public use by order of the Authority, but final acceptance of the Work is subject to delay because of minor uncompleted items which do not impair the usefulness of the Contract, a semi-final estimate shall also be prepared within a like period of 65 days after the Contract has been substantially completed and placed in public use. Such semi-final estimate shall include an intimate of the value of all Work provided in accordance with the terms of the Contract, including the amount of retained percentage withheld by the Authority from previous periodic payments, but excluding (a) the same deductions and retainage sufficient to cover subcontractors and materialmen's claims and other amounts to be deducted and retained in accordance with the terms of the Contract,

as provided by the first paragraph of this Article; (b) an amount equal to the estimated value of the work remaining to be performed and (c) any items or claims for extra Work, or parts thereof, that may be in dispute; and payment for such excluded items or portions thereof, may be deferred until such remaining work has been satisfactorily completed, or in the case of disputed items or claims until such time as agreement has been reached thereon or such claims have been adjudicated.

## **1.10 SUBSTANTIAL COMPLETION AND FINAL ACCEPTANCE**

A. See Section 00700 - General Condition for Substantial Completion and Final Acceptance.



**END OF SECTION**